

Table 1. Etiology and estimated incidence of acute pericarditis in developed countries

Condition	Estimated incidence (%)
Idiopathic	Most common (>80) ¹
Infectious	
Viral	Uknown but considered very common ¹
Parvovirus B19, Epstein-Barr and other Herpes viruses (esp CMV, human herpes virus 6), Enteroviruses (esp coxsackievirus, echoviruses), Adenovituses (esp in children), HIV	
Bacterial	5-10
Tuberculous, ² coxiella burnetii, borrelia burgdoferi, and rarely: meningococcus, gonococcus, streptococcus, haemophilus, staphylococci, chlamydia, mycoplasma, legionella, leptospira, listeria, Providencia stuartii.	
Fungal	Rare
Histoplasma, and in immunosuppressed pts: aspergillosis, blastomycosis, candida	
Parasites	Very rare
echinococcus, toxoplasma	
Autoimmune	<10
Systemic sclerosis, SLE, Rheumatoid arthritis, systemic vasculitides, sarcoidosis Familial Mediterranean fever Myocarditis Myocardial infarction Post-cardiotomy Post-ablation	
Neoplastic disease	5-35
Metastatic	
Lung, breast, lymphoma	
Primary	
Pericardial mesothelioma	
Metabolic	
Uremia	5-10
Before or after initiation of dialysis	
Myxedema	
Chest wall trauma	Rare
Aortic dissection	Rare
Irradiation	Rare
Drug-related	Rare

procainamide, hydralazine, isoniazid,
 phenytoin (lupus-like syndrome),
 penicillins (hypersensitivity pericarditis
 with eosinophilia)
 doxorubicin, daunorubicin, fluoracil, cyclophosphamide, cytosine arabinoside

Estimated incidence is derived from studies excluding patients with renal failure, neoplasia, trauma, or radiation.

1: Most idiopathic cases are thought to be viral

2: in developing countries, the prevalence of tuberculous pericarditis is high: 70% to 80% of pericarditis in sub-Saharan Africa, and $\geq 90\%$ when associated with HIV infection.

HBV: hepatitis B, HCV: hepatitis C, CMV: cytomegalovirus, HIV: human immunodeficiency virus, SLE: systemic lupus erythematosus, RA: rheumatoid arthritis

Table 2. ESC 2025 GL on myocarditis and pericarditis. Indicators of non-viral aetiologies and complications (high-risk features or red flags in acute pericarditis)

Major
Fever $>38^{\circ}\text{C}$ (HR 3.56)
Subacute onset (HR 3.97)
Large pericardial effusion (>20 mm on echocardiography) (HR 2.15)
Cardiac tamponade (HR 2.15)
Lack of response to aspirin or NSAID after at least 1 week of therapy (HR 2.50)
Minor
Pericarditis associated with myocarditis
Immunodepression
Trauma
Oral anticoagulant therapy

HR, hazard ratio; NSAID, non-steroidal anti-inflammatory drug. Major features have been validated in multivariable analysis in a prospective cohort study of patients with acute pericarditis.¹⁰⁵

Table 3. ESC 2025 GL on myocarditis and pericarditis. Red flags for the clinical diagnosis of myocarditis and pericarditis

Pericarditis
Recent or concomitant flu-like syndrome or gastroenteritis
Pleuritic/infarct-like chest pain
Right HF symptoms and signs of constriction
Fever
Pericardial rubs
C-reactive protein elevation
Pericardial effusion
Pleural effusion
Polyserositis
CMR imaging with pericardial oedema and/or LGE

CK-MB, creatinine kinase muscle-brain type; CMR, cardiovascular magnetic resonance; ECG, electrocardiogram; HF, heart failure; hs-Tn; high-sensitivity troponin; LGE, late gadolinium enhancement; NT-proBNP, N-terminal prohormone of brain natriuretic peptide.

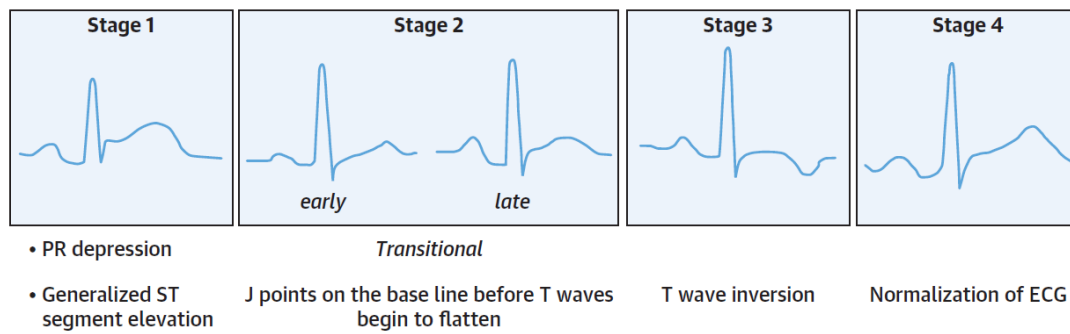


Figure 1. ECG Changes in acute pericarditis.

Chiabrando JC, et al. Management of Acute and Recurrent Pericarditis. *JACC*. 2020.

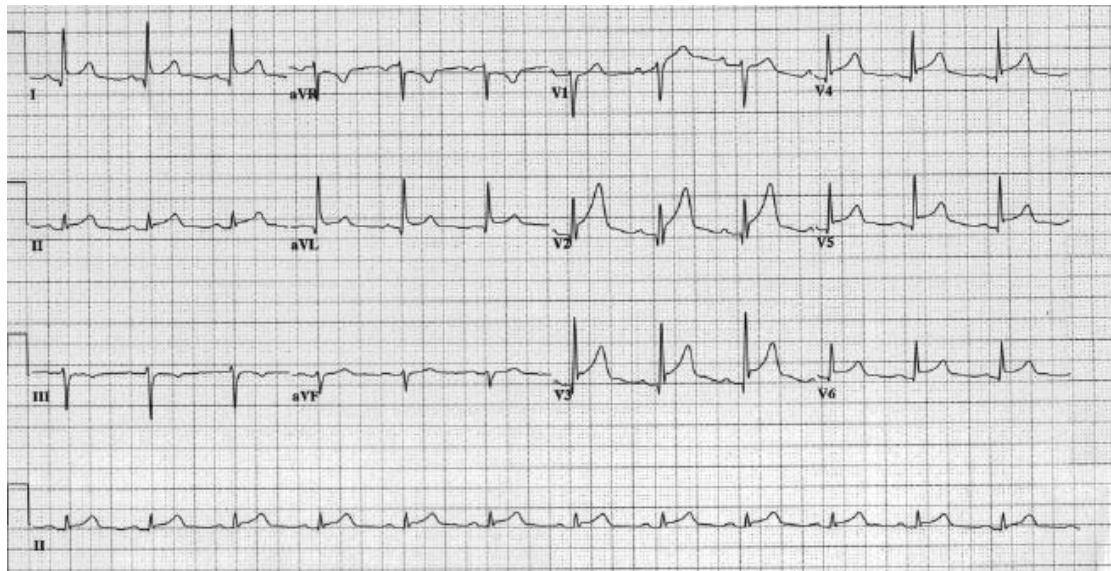


Figure 2. Apparently idiopathic acute pericarditis: nearly ubiquitous J (ST) elevations with corresponding J (ST) depression in aVR. As is common in III and aVF when the QRS axis is horizontal (or these leads are of small voltage), the J (ST) is not elevated. The height of J (ST) is >25% of the height of the T-wave peak in V5 and V6. Most PR segments are slightly depressed with respect to the T-P baseline (corresponding PR elevation in aVR). In the clinical setting, a spectrum of myopericardial inflammatory syndromes can be encountered, ranging from pure pericarditis to forms with increasing myocardial involvement (sometimes mimicking an acute coronary syndrome).

Imazio M, et al. Controversial issues in the management of pericardial diseases. *Circulation*. 2010;121:916-28.

Table . ESC 2025 GL on myocarditis and pericarditis. Recommendations for the use of cardiovascular magnetic resonance imaging

CMR is recommended in patients with suspected pericarditis when a diagnosis cannot be made using clinical criteria to assess evidence of pericardial thickening, oedema, LGE, and to assess the persistence of disease during follow-up in selected cases.^{110,129,165,187–194}

I

B

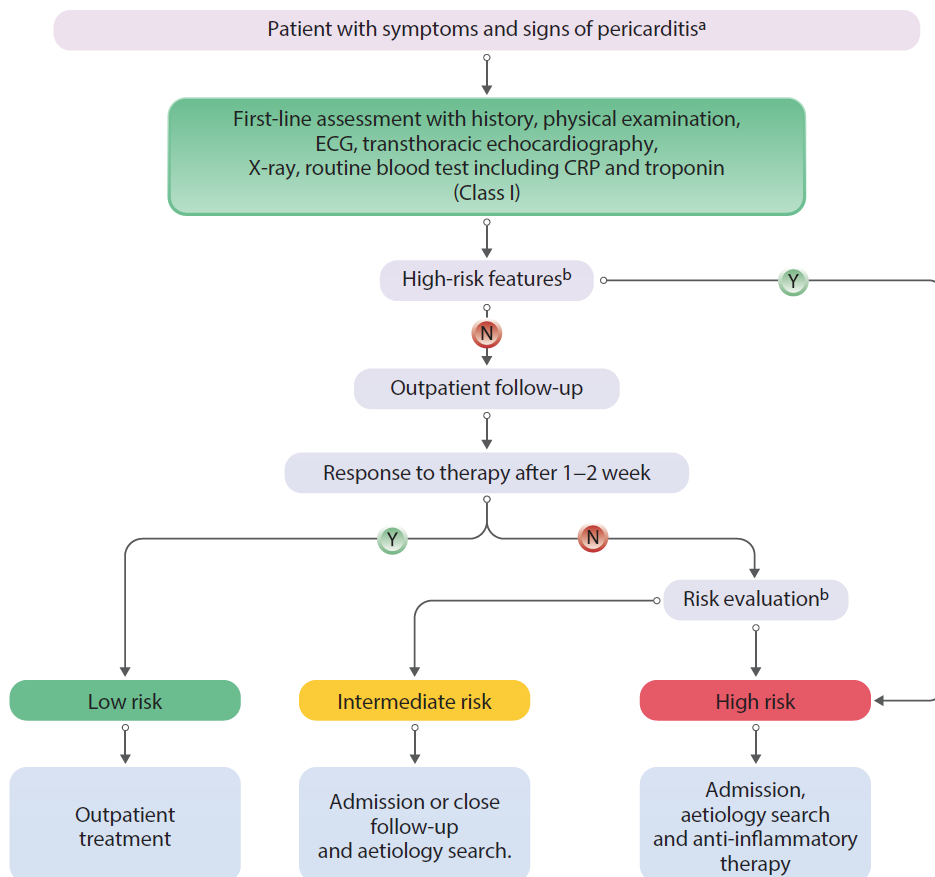


Figure 3. ESC 2025 GL on myocarditis and pericarditis. Diagnostic algorithm and triage for pericarditis.

CRP, C-reactive protein; ECG, electrocardiogram; N, no; Y, yes.

bIf a patient has one or more prognostic predictors, a high-risk patient must be admitted to hospital, and an aetiology search should be performed.

Patients without high-risk features can be managed as outpatients without an aetiology search and admission if there is a good response to empirical anti-inflammatory therapy.

Table 5. ESC 2025 GL on myocarditis and pericarditis. Clinical risk stratification to guide work-up in inflammatory myopericardial syndrome

Risk	High risk	Intermediate risk	Low risk
Pericarditis	• Signs and symptoms of cardiac tamponade • Fever (temperature >38°C) • Effusive–constrictive pericarditis • Failure of NSAID therapy • Incessant pericarditis	• Signs and symptoms of right HF	• Response to adequate therapy within 1–2 weeks
	Imaging criteria:	Imaging criteria:	Imaging criteria:
	• Large PEff (>20 mm end-diastole) • Cardiac tamponade • Extensive pericardial LGE on CMR	• Moderate–large PEff (10–20 mm end-diastole) • Constrictive physiology regardless of the size of the effusion	• Absence or mild PEff • Absence of pericardial LGE on CMR

AV, atrioventricular; CMR, cardiovascular magnetic resonance; HF, heart failure; LGE, late gadolinium enhancement; LVEF, left ventricular ejection fraction; NSAID, non-steroidal anti-inflammatory drug; NYHA, New York Heart Association classification; PEff, pericardial effusion; WMA, wall motion abnormalities.

Table 6. ESC 2025 GL on myocarditis and pericarditis Recommendations for medical therapy in pericarditis

Colchicine is recommended as first-line therapy in patients with pericarditis as an adjunct to aspirin/NSAID or corticosteroid therapy to reduce subsequent recurrences. ^{24,25,108,275–278}	I	A
Anti-IL-1 agents (anakinra or rilonacept) are recommended for patients with recurrent pericarditis after failure of first-line therapies and corticosteroids and elevation of C-reactive protein levels to reduce recurrences and allow corticosteroid withdrawal. ^{108,275,282–284}	I	A
High-dose aspirin or NSAIDs with proton pump inhibitors are recommended as first-line therapy in patients with pericarditis to control symptoms and reduce recurrences. ^{291,292}	I	B
A β -blocker should be considered in symptomatic patients, despite full anti-inflammatory therapy, and heart rate at rest >75 b.p.m. in order to improve symptom control. ²⁷⁴	IIa	C
Anti-IL-1 agents (anakinra or rilonacept) should be considered in cases of incessant/recurrent pericarditis with evidence of pericardial inflammation on CMR after failure, contraindications, and intolerance to first-line therapies and corticosteroids regardless of C-reactive protein levels to reduce recurrences and allow corticosteroid withdrawal.	IIa	C
Low- to medium-dose ^c corticosteroids should be considered for patients with pericarditis only in cases of contraindication/failure of aspirin/NSAIDs and colchicine, or when there is a specific indication to control symptoms and reduce recurrences ^d .	IIa	C
Hydroxychloroquine may be considered in patients with recurrent pericarditis refractory to standard therapy (including corticosteroids and anti-IL-1 agents) to prolong recurrence-free survival. ²⁹⁰	IIb	B
Corticosteroids are not recommended as the first option for patients with pericarditis therapy without a specific indication ^d .	III	C

b.p.m., beats per minute; CMR, cardiovascular magnetic resonance; IL, interleukin; NSAID, non-steroidal anti-inflammatory drug.

^dFor example, systemic inflammatory disease on maintenance therapy with corticosteroids, post-pericardiotomy syndromes, post-vaccine pericarditis, severe renal failure, concomitant therapies interacting with NSAIDs such as oral anticoagulant.

Table 7. ESC 2025 GL on myocarditis and pericarditis.**Specific initial dosing and duration of therapy for acute and recurrent pericarditis**

Therapy	Dosing	Duration ^a	Tapering ^a
Aspirin ^b	750–1000 mg 3 times daily	1–2 weeks	Decrease by 250 mg every 1–2 weeks
Ibuprofen ^b	600–800 mg 3 times daily	1–2 weeks	Decrease by 200 mg every 1–2 weeks
Indomethacin	25–50 mg 3 times daily	1–2 weeks	Decrease by 25 mg every 1–2 weeks
Colchicine ^b	0.5 mg once daily (<70 kg or severe renal impairment) or 0.5 mg twice daily	3–6 months	Not required
Prednisone	0.2–0.5 mg/kg/day	2–4 weeks	Several months
Treatment for recurrences only:			
Azathioprine	Starting with 1 mg/kg/day then gradually increased to 2–3 mg/kg/day	Several months	Several months
IVIg	400–500 mg/kg i.v. daily for 5 days	5 days	Not required
Anakinra	1–2 mg/kg/day up to 100 mg/day in adults	At least 6 months/ >12 months	Needed (at least 3–6 months)/ unknown
Rilonacept ^c	320 mg once daily followed by 160 mg weekly		

IVIg, intravenous immunoglobulins; NSAID, non-steroidal anti-inflammatory drug.

Treatment for recurrences only is highlighted in grey.

^aTherapy duration as initial dosing; for all treatments the attack dose is maintained until symptom resolution and normalization of inflammatory markers (e.g. C-reactive protein) and other investigations (electrocardiogram, echocardiogram) then tapering is recommended. It should be tailored to the single patient according to disease severity and patient response. Tapering is especially important for corticosteroids where tapering is particularly slow, especially below 15 mg/day, the common threshold for recurrences (see Table 14). Monitoring is essentially based on the assessment of blood count, creatinine, creatine kinase, transaminases, C-reactive protein, echocardiography. Anakinra should be tapered after clinical remission. Different schemes are adopted: e.g. reducing one dose per week every month; every other day full dose for at least 3 months then half-dose every other day for at least 3 months.

^bAspirin and ibuprofen are common first-level treatments for the first episode of pericarditis (acute pericarditis) associated with colchicine for at least 3 months. Aspirin is the preferred choice for patients with ischaemic heart disease. Indomethacin is usually considered for incessant/recurrent cases. In incessant/recurrent cases, colchicine is maintained for at least 6 months. Aspirin/NSAID full dose is recommended for patients with normal or mildly reduced renal function. For those with moderate to severe renal impairment, dose adjustment or use of corticosteroids is recommended.

^cRilonacept is registered in the USA but is not currently available in Europe. Anakinra, due to its short half-life, may be the preferable choice in patients at increased risk of infections.

Tapering of corticosteroids

Prednisone dose ^a	Starting dose 0.20–0.50 mg/kg/day ^a	Tapering ^b
Prednisone daily dose	>50 mg	10 mg/day every 1–2 weeks
	50–25 mg	5–10 mg/day every 1–2 weeks
	25–15 mg	2.5 mg/day every 2–4 weeks
	<15 mg	1.25–2.5 mg/day every 2–6 weeks

^aAvoid higher doses except for special cases, and only for a few days, with rapid tapering to 25 mg/day. Prednisone 25 mg is equivalent to methylprednisolone 20 mg.

^bEvery decrease in prednisone dose should be done only if the patient is asymptomatic and C-reactive protein is normal, particularly for doses of <25 mg/day.

Calcium intake (supplement plus oral intake) of 1200–1500 mg/day and vitamin D supplementation of 800–1000 IU/day should be offered to all patients receiving glucocorticoids. Moreover, bisphosphonates are recommended to prevent bone loss in all men aged ≥50 years and postmenopausal women in whom long-term treatment with glucocorticoids is initiated at a dose of ≥5.0–7.5 mg/day of prednisone or equivalent.²⁸⁰

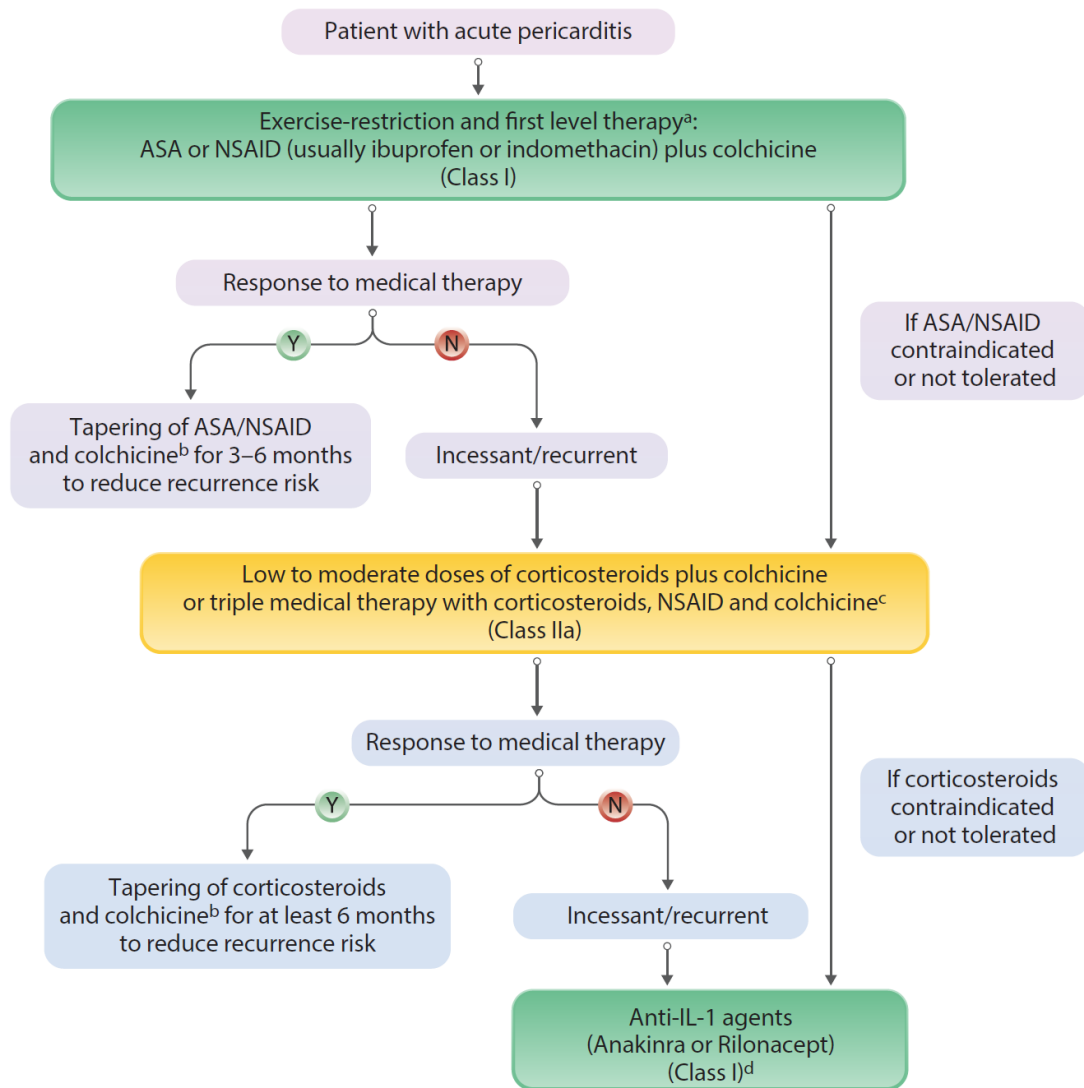


Figure 4. ESC 2025 GL on myocarditis and pericarditis. Proposed algorithm of medical therapy for pericarditis in adults (not including interventional therapies and pericardiectomy).

ASA, acetyl salicylic acid; IL-1, interleukin-1; CRP, C-reactive protein; CMR, cardiovascular magnetic resonance; LOE, level of evidence; N, no; NSAID, non-steroidal anti-inflammatory drug; Y, yes.

^aASA is the first option if patients are already on antiplatelet therapy with ASA. Ibuprofen is usually preferred as the first NSAID. Try more than one agent to evaluate response. Gastroprotection with a proton pump inhibitor is always recommended with use of aspirin/ NSAID.

^bColchicine is recommended to prevent recurrence. Consider at least 3 months for the first episode of pericarditis and at least 6 months for incessant/recurrent cases. Colchicine to be withdrawn as last drug only after stable remission. Tapering is recommended to reduce the persistence/ recurrence of symptoms. Tapering is slower for corticosteroids. Colchicine tapering is usually not performed due to the duration of >3–6 months of therapy. For response to therapy we considered clinical remission.

^cLow to moderate dose of corticosteroids (e.g. prednisone 0.2–0.5 mg/kg/day or equivalent doses of an alternative corticosteroid).

^dClass I LOE A, Class IIa LOE C regardless of C-reactive protein levels if CMR evidence of pericardial inflammation.

Table 8. Cancer patients**ESC 2025 GL on myocarditis and pericarditis. Recommendations for neoplastic pericardial involvement**

Pericardiocentesis is recommended for patients with cardiac tamponade to relieve symptoms and establish the diagnosis of malignant pericardial effusion. ^{576,583}	I	C
Extended pericardial drainage (3–6 days) is recommended in patients with suspected or definite neoplastic pericardial effusion to prevent effusion recurrence. ^{576,583}	I	B
Cytological analysis of pericardial fluid is recommended in patients with neoplastic pericarditis for the confirmation of malignant pericardial disease. ⁵⁸¹	I	C
Systemic antineoplastic treatment is recommended in confirmed cases of neoplastic aetiology to treat the primary and secondary metastatic neoplastic involvement. ⁵⁸²	I	C
Pericardiocentesis should be considered in patients with moderate to large pericardial effusion to establish the diagnosis of malignant pericardial effusion when the diagnosis cannot be reached by multimodality imaging. ⁵⁸⁴	IIa	C
Pericardial or epicardial biopsy may be considered in patients with suspected malignant pericardial disease when the diagnosis cannot be reached by multimodality imaging or cytological analysis, to confirm the diagnosis.	IIb	C
Intrapericardial therapy, in agreement with the oncologist, may be considered in cases refractory to systemic antineoplastic treatment.	IIb	C

ESC 2022 GL on cardio-oncology. Recommendations for the management of pericardial diseases in patients receiving anticancer treatment

General

Diagnosis and management of acute pericarditis in patients with cancer based on the 2015 ESC Guidelines for the diagnosis and management of pericardial diseases is recommended and a multidisciplinary discussion is needed before interrupting cancer therapy. I C

A surgical pericardial window if the percutaneous approach is not feasible or in cases of recurrent malignant pericardial effusions. IIa C

Intrapericardial instillation of cytostatic or sclerosing agents for prevention of recurrence. IIb C

Diagnosis and management of ICI-associated pericarditis

Multimodality CV imaging (echocardiography, CMR+ CT), ECG and measurement of cardiac biomarkers to confirm the diagnosis, assess the haemodynamic consequences of pericardial disease, and rule out associated myocarditis. I C

Prednisolone and colchicine for patients with ICI-associated pericarditis. I C

Interruption of ICI treatment in patients with confirmed ICI-associated pericarditis with moderate-to-severe pericardial effusion I C

A multidisciplinary discussion before restarting ICI treatment. I C

Recommendation for adult cancer survivors with pericardial complications

Patients with acute pericarditis during RT to a volume including the heart are at higher risk of developing chronic constrictive pericarditis, hence echocardiography surveillance every 5 years. IIb C

CMR, cardiac magnetic resonance; CT, computed tomography; CV, cardiovascular; ECG, electrocardiogram; ESC, European Society of Cardiology; ICI, immune checkpoint inhibitors.

Table 9. ESC 2025 GL on myocarditis and pericarditis. Recommendations for post-cardiac injury syndrome

Anti-inflammatory therapy is recommended in patients with PCIS to hasten symptom remission and reduce recurrences. ^{292,600}	I	B
IL-1 antagonists are recommended in patients with refractory PCIS to prevent recurrences and progression to constriction. ⁶⁰⁴	I	B
High-dose aspirin is recommended as the first-choice anti-inflammatory therapy for post-myocardial infarction pericarditis and in patients being already on antiplatelet therapy.	I	C
Colchicine, started 48 to 72 h before cardiac surgery, should be considered for 1 month in patients after cardiac surgery for the prevention of PCIS if there are no contraindications and if it is tolerated. ^{594,596}	IIa	A
Careful follow-up should be considered in patients with PCIS to exclude possible evolution towards constrictive pericarditis. ³⁴⁷	IIa	C

IL, interleukin; PCIS, post-cardiac injury syndrome.

Table 10. ESC 2025 GL on myocarditis and pericarditis. Recommendations for purulent pericarditis

Urgent pericardiocentesis and/or a surgical window is recommended in patients with suspicion of purulent pericarditis to establish a diagnosis. ⁶⁰⁶	I	C
Intrapericardial fibrinolysis should be considered in patients with purulent pericarditis to allow complete drainage of purulent fluid and to prevent constriction. ^{573,610}	IIa	B

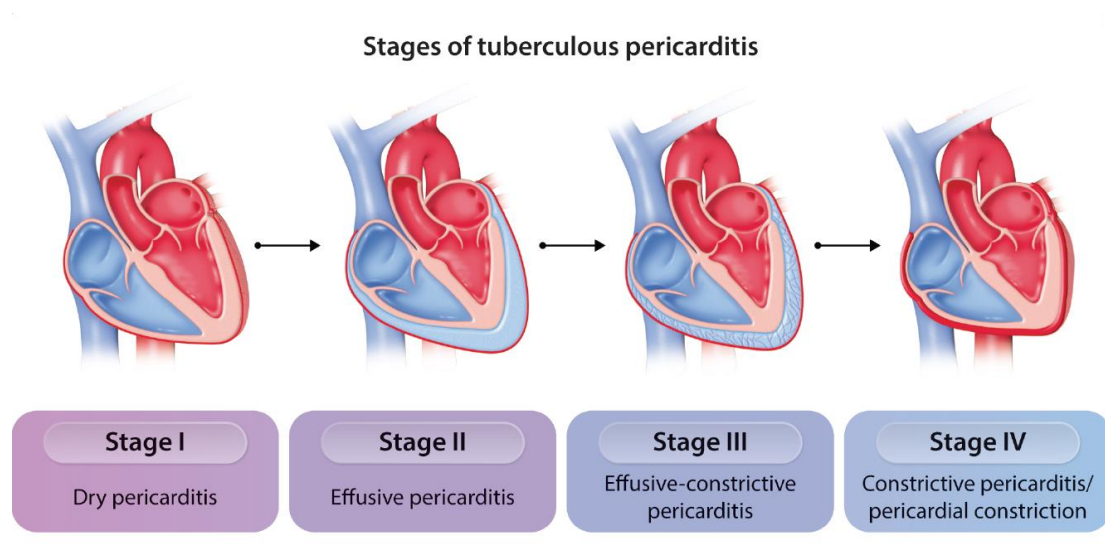


Figure 5. ESC 2025 GL on myocarditis and pericarditis. Stages of tuberculous pericarditis.

Table 11. ESC 2025 GL on myocarditis and pericarditis. Recommendations for tuberculous pericarditis

Diagnosis and treatment of tuberculous pericarditis and effusion		
Diagnostic pericardiocentesis is recommended in all patients with suspected tuberculous pericarditis when diagnosis is not confirmed by non-invasive tests to identify the aetiological agent in pericardial fluid. ⁵⁷⁰	I	C
Empirical antituberculosis chemotherapy is recommended in patients living in endemic areas with exudative pericardial effusion after excluding other causes to treat the most likely cause. ^{567,570}	I	C
Standard antituberculosis multidrug treatment for 6 months is recommended in patients with tuberculous pericarditis for the prevention of pericardial constriction. ⁵⁷⁰	I	C
Pericardiectomy is recommended in patients with tuberculous pericarditis if the condition is not improving or is deteriorating after 4–8 weeks of antituberculosis therapy to change the course of disease.	I	C
Adjunctive steroid therapy should be considered in HIV-negative cases to prevent the development of constrictive TB pericarditis. ⁵⁶⁹	IIa	C
In non-endemic areas a pericardial biopsy may be considered in patients with >3 weeks of illness without aetiological diagnosis.	IIb	C
Empirical antituberculosis treatment is not recommended in patients living in non-endemic areas.	III	C

HIV, human immunodeficiency virus; TB, tuberculosis.

Table 12. ESC 2020 Guidelines on sports. Recommendations for exercise in individuals with pericarditis

Return to all forms of exercise including competitive sports after 30 days to 3 months for individuals who have recovered completely from acute pericarditis, depending on clinical severity.	I C
Participation in leisure-time or competitive sports is not recommended for individuals with a probable or definitive diagnosis of recent pericarditis while active inflammation is present, regardless of age, sex, or extent of LV systolic dysfunction.	III C
Participation in moderate- to high-intensity exercise, including competitive sports, is not recommended for individuals with constrictive pericarditis.	III C

LV = left ventricle

Table 13. ESC 2022 GL on non-cardiac surgery. Recommendations for pericardial diseases

In patients with acute pericarditis, defer elective NCS until complete resolution of the underlying process	IIa C
Avoid elective NCS procedures under general anaesthesia until colchicine or the immunosuppressive treatment course for pericardial disease is completed	IIb C

Table 14. ESC 2025 GL on myocarditis and pericarditis. Recommendations for pregnancy, lactation, and reproductive issues

Pre-conception counselling is recommended in women with recurrent pericarditis or myocarditis to assess disease activity and to review therapy.	I	C
NSAIDs should be considered in pregnant patients with pericarditis until the 20th week to treat an incessant/recurrent course. ⁶⁶⁴	IIa	C
Anti-inflammatory therapies should be considered in patients with pericarditis during lactation to treat and prevent pericarditis with timing adjusted to reduce drug exposure of the breastfed infant.	IIa	C
During pregnancy and breastfeeding, corticosteroids at the minimal effective dose (preferably up to 20 mg prednisone daily) should be considered in patients with active pericarditis, despite NSAID (if feasible), to prevent an incessant/recurrent course. ⁶⁶⁴	IIa	C
Colchicine may be considered in pregnant patients with pericarditis, especially in patients already receiving this drug to prevent recurrences.	IIb	C
Anakinra may be considered through pregnancy and lactation in pregnant patients with recurrent pericarditis who are not able to use alternative therapies to prevent an incessant/recurrent course.	IIb	C

NSAID, non-steroidal anti-inflammatory drug.